1) Create a table of values for the following system to determine the point of intersection.

$y = 3x + 9$

$y = 2x + 7$

x	$y = 3x + 9$
-2	3
-1	6
0	9
1	12
2	15

x	$y = 2x + 7$
-2	3
-1	5
0	7
1	9
2	11

∴ the POI is (-2, 3)

2) Two cars drive from Kingston to Niagara Falls. Car A leaves first and travels 85km/h. When car A has gone 40 km, car B leaves Kingston and travels at a speed of 95 km/h.

Car A: $d = 85t + 40$

Car B: $d = 95t$

Where t is the time in hours and d is the distance in km from Kingston.

Solve the system. When does car B pass car A and how far are they from Kingston?

Elimination

$d = 85t + 40$

$-\ d = 95t$

$0d \triangleq -10t + 40$

$\frac{10t}{10} = \frac{40}{10}$

$t = 4$

Sub $t = 4$ into $d = 95t$

$d = 95t$

$d = 95(4)$

$d = 380$

∴ the solution to the system is (4, 380)

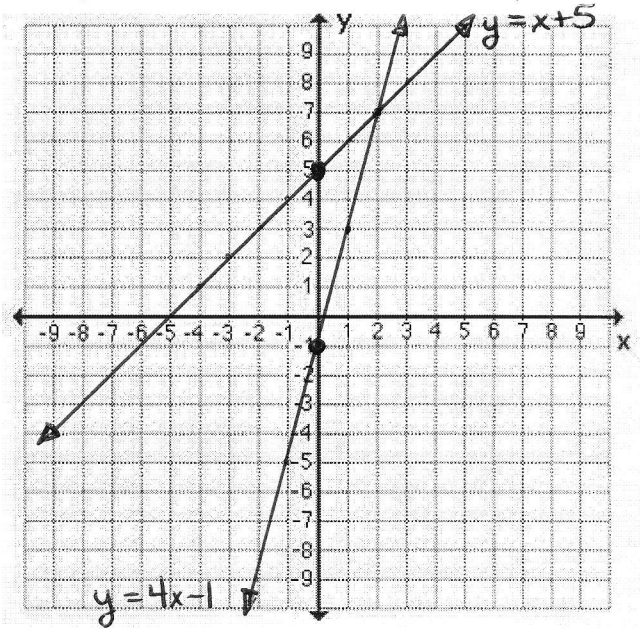
CAR B will pass CAR A after 4 hours.

3) Graph the following two lines to determine their point of intersection. Check your answer. (using a LS = RS check)

a) $y = x + 5$ $\quad m = 1 = \frac{\text{Rise}}{\text{Run}} = \frac{1}{1}$, $b = 5$

$y = 4x - 1$ $\quad m = 4 = \frac{\text{Rise}}{\text{Run}} = \frac{4}{1}$, $b = -1$

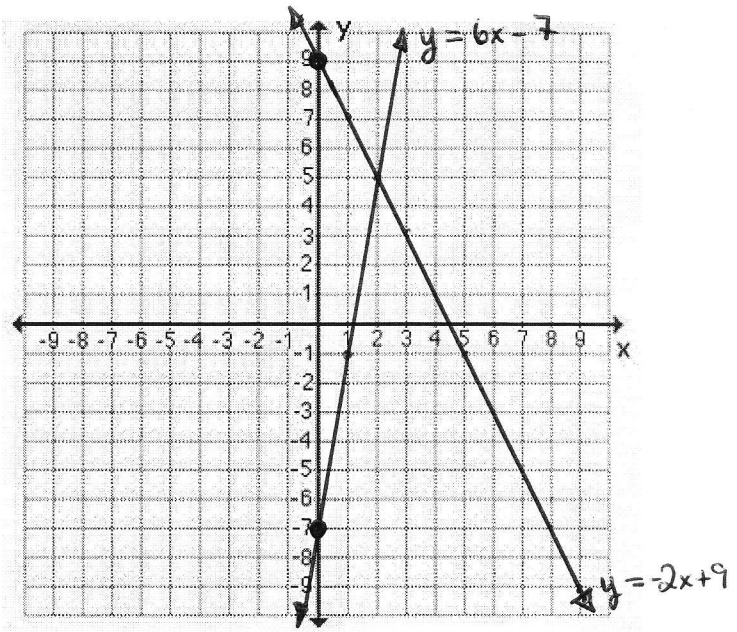
∴ the POI is (2, 7)



b) $y = 6x - 7$ $\quad m = 6 = \frac{\text{Rise}}{\text{Run}} = \frac{6}{1}$, $b = -7$

$y = -2x + 9$ $\quad m = -2 = \frac{\text{Rise}}{\text{Run}} = \frac{-2}{1}$, $b = 9$

∴ the POI is (2, 5)



4) Find the point of intersection graphically.

① $4x - 5y = 5$

② $x + y = 8$

① $4x - 5y = 5$

$\frac{4x}{5} - \frac{5}{5} = \frac{5y}{5}$

$\frac{4}{5}x - 1 = y$

$y = \frac{4}{5}x - 1$

$m = \frac{4}{5}$

$b = -1$

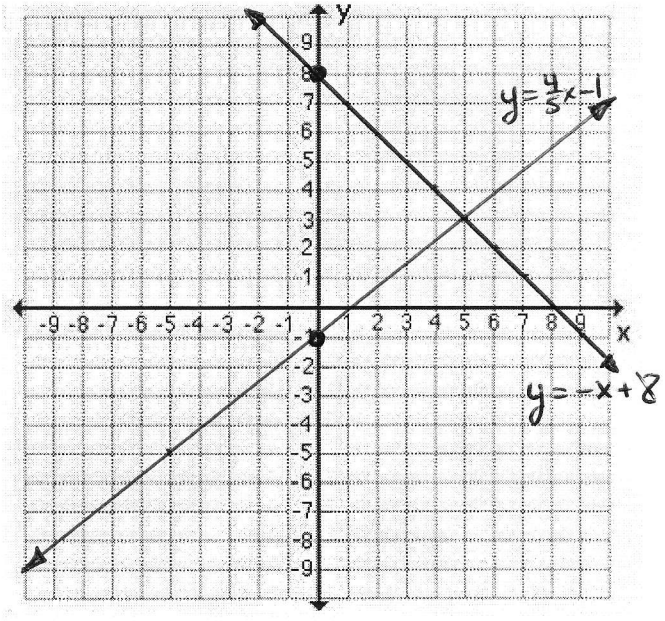
② $x + y = 8$

$y = -x + 8$

$m = -1 = \frac{-1}{1}$

$b = +8$

∴ the POI is (5, 3)



5) Solve the following systems by substitution.

a) ① $2x+y=6$
② $4x-5y=-16$

Rearrange ① to isolate y

$2x+y=6$

③ $y=-2x+6$

Substitute $y=-2x+6$ into ②

$4x-5y=-16$

$4x-5(-2x+6)=-16$

$4x+10x-30=-16$

$14x-30=-16$

$14x=-16+30$

$\frac{14x}{14}=\frac{14}{14}$

$x=1$

Sub $x=1$ into ①

$2x+y=6$

$2(1)+y=6$

$2+y=6$

$y=6-2$

$y=4$

∴ the solution to the system is $(1,4)$

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b) ① $x-4y=5$
② $-3x+y=18$

Rearrange ① to isolate x

$x-4y=5$

③ $x=4y+5$

Substitute $x=4y+5$ into ②

$-3x+y=18$

$-3(4y+5)+y=18$

$-12y-15+y=18$

$-11y=18+15$

$\frac{-11y}{-11}=\frac{33}{-11}$

$y=-3$

Sub $y=-3$ into ①

$x-4y=5$

$x-4(-3)=5$

$x+12=5$

$x=5-12$

$x=-7$

∴ the solution to the system is $(-7,-3)$

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c) ① $x+4y=-13$
② $-4x+3y=14$

Rearrange ① to isolate x

① $x+4y=-13$

③ $x=-4y-13$

Substitute $x=-4y-13$ into ②

$-4x+3y=14$

$-4(-4y-13)+3y=14$

$+16y+52+3y=14$

$19y=14-52$

$\frac{19y}{19}=\frac{-38}{19}$

$y=-2$

Sub $y=-2$ into ①

$x+4y=-13$

$x+4(-2)=-13$

$x-8=-13$

$x=-13+8$

$x=-5$

∴ the solution to the system is $(-5,-2)$

6) Solve the following systems by elimination

a)
$$\begin{array}{rl} & x+y=2 \quad ① \\ + & 2x-y=4 \quad ② \\ \hline & 3x+0y=6 \end{array}$$

$$\frac{3x}{3}=\frac{6}{3}$$

$$x=2$$

Sub $x=2$ into ①

$$x+y=2$$

$$2+y=2$$

$$y=2-2$$

$$y=0$$

∴ the solution to the system is $(2,0)$

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b)
$$\begin{array}{rl} & 5x-4y=6 \quad ① \\ - & 5x+2y=12 \quad ② \\ \hline & 0x-6y=-6 \end{array}$$

$$\frac{-6y}{-6}=\frac{-6}{-6}$$

$$y=+1$$

Sub $y=-1$ into ①

$$5x-4y=6$$

$$5x-4(+1)=6$$

$$5x+4=6$$

$$5x=6+4$$

$$\frac{5x}{5}=\frac{10}{5}$$

$$x=2$$

∴ the POI is $(2,1)$

c) Which ordered pair (if any) is a solution to the given system of linear equations?

Show your work
$$\begin{array}{l} 3x-4y=-28 \quad ① \\ 5x+2y=-12 \quad ② \end{array}$$

(-1,4) or (3,2)

① L.S. $=3x-4y$ R.S. $=-28$

$=3(-1)-4(4)$

$=-3-16$

$=-19$

L.S. $\neq$ R.S.

(-1,4) is not a solution

① L.S. $=3x-4y$ R.S. $=-28$

$=3(3)-4(2)$

$=9-8$

$=+1$

L.S $\neq$ R.S.

(3,2) is not a solution

7) A cash box contains 87 coins in loonies and toonies. If the total value of the money is $161, how many of each kind of coin is there? The situation can be represented by the following system of equations:

$l + t = 87$ ①

$l + 2t = 161$ ②

where l represents number of loonies and t represents the number of toonies.

Elimination

$$\begin{array}{r} l + t = 87 \\ -\ l + 2t = 161 \\ \hline 0 - t = -74 \end{array}$$

$$\frac{-t}{-1} = \frac{-74}{-1}$$

$$t = 74$$

Sub $t = 74$ into ①

$$l + t = 87$$

$$l + 74 = 87$$

$$l = 87 - 74$$

$$l = 13$$

∴ 74 toonies and 13 loonies will be needed.

8) The cost of printing a high school's yearbooks includes a $3185 design and set-up charge plus $21 per copy. The selling price of a yearbook is $28. The cost and revenue can be represented by the following system of equations:

Cost: $C = 3185 + 21b$ ①

Revenue: $C = 28b$ ②

where b is the number of yearbooks and C is an amount in dollars.

How many yearbooks must be sold to break even? (Find when Cost and Revenue are equal)

Elimination

$$\begin{array}{r} C = 21b + 3185 \\ -\ C = 28b \\ \hline 0C = -7b + 3185 \end{array}$$

$$\frac{7b}{7} = \frac{3185}{7}$$

$$b = 455$$

∴ 455 yearbooks need to be sold to break even.